Management Zones Help in Precision Agriculture

Precision agriculture—modifying the management within fields by using information about soil and crop variability—can be useful to farmers. They may use fewer chemicals (which saves them money and benefits the environment) and at the same time they may increase their yields. Generally, farmers are interested in targeting their inputs and labor to where they can get the most return on their dollar and protect the environment. Precision agriculture methods and technologies can help them do that.

Agricultural Research Service (ARS) soil scientist Newell R. Kitchen believes there could be a resurgence in precision agriculture thanks to the recent Farm Bill and its increased support for conservation programs.

One method of precision agriculture is to create "management zones" within fields—specific areas within a field that respond to management practices in a similar way. There are various ways to create these zones.

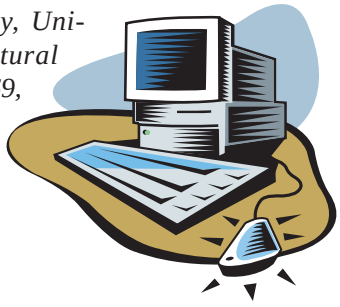
One new way is to take mapped soil and/or crop information and let a computer mathematically find the "most alike" areas of the field. The computer can take thousands of numbers and find areas that are alike, cluster them together, and generate a map. Kitchen's research group has developed a software program called Management Zone Analyst, or MZA, that does this quickly and easily.

"One may create various management zones for a field, but the map will likely look different depending on what management practice is being done," Kitchen explains. For example, a management zone map for weed management will probably not be the same as one for nitrogen fertilizer.

Kitchen stresses the need for validating the management zone map. "It's a mathematical approach," he says. "We need to take other information into account to make sure it's valid."

To learn more and to download the MZA program, go to www.fse.missouri.edu/ars/decision_aids.htm.—By **David Elstein,** ARS.

Newell R. Kitchen is with the USDA-ARS Cropping Systems and Water Quality Research Laboratory, University of Missouri, Agricultural Engineering Building, Room 269, Columbia, MO 65211; phone (573) 882-1135, fax (573) 882-1115, e-mail kitchenn@missouri.edu. ★



Beating Back Blue Mold

For many an apple, without protection after harvest, the stage is set for an uneaten end. When an apple is injured, fresh fruit flesh turns soft, brown, and watery. Older lesions are sometimes invaded by a white fungus that eventually produces bluish-green spores. All this ends in a confluence of musty odors and lesions covered by fluffy fungal bodies.

The actor in this drama is *Penicillium expansum,* otherwise known as blue mold. It's the most significant cause of postharvest decay of stored apples in the United States. Losses from postharvest decay could be as high as 25 percent of the world's harvested fruits.

Farmers use a variety of methods to control such costly decay of fruits and vegetables. Fungicides are a common treatment to suppress postharvest decay organisms. But in keeping with the goal of farmers to reduce dependence on synthetic chemicals, Agricultural Research Service scientists have been working on developing biological controls as environmentally benign alternatives.

Biological products, such as friendly yeasts or bacteria, work by consuming nutrients in fruit and vegetable wounds that would otherwise allow rot-causing fungi to thrive. There is much interest in using normally occurring antagonistic microorganisms—decay-curbing yeasts and bacteria—as effective alternatives to fungicides.

Wojciech Janisiewicz, with ARS' Appalachian Fruit Research Station in Kearneysville, West Virginia, has filed a patent for a novel biocontrol agent aimed at neutralizing blue mold.

Janisiewicz isolated a yeast, *Metschnikowia pulcherrima,* that occurs naturally on buds, flowers, and fruits of apple trees. *M. pulcherrima* is one of several yeast species that exhibit strong antagonistic activity against postharvest decays of pome fruits, such as apples and pears.

Janisiewicz showed *M. pulcherrima* to be highly effective as an antagonist against blue mold—even at cold-storage temperatures—a feature of major importance to produce-warehouse operators.

The lab is now looking for a company to work with to mass-produce *M. pulcherrima* for commercial use.—By **Rosalie Marion Bliss,** ARS.

Wojciech J. Janisiewicz is at the USDA-ARS Appalachian Fruit Research Station, 45 Wiltshire Rd., Room 333, Kearneysville, WV 25430; phone (304) 725-3451, ext. 358, fax (304) 728-2340, e-mail wjanisie@afrs.ars.usda.gov. ★